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EXAMINER	
THOMAS, MIA M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/648,776	BOSCO ET AL.	
	Examiner	Art Unit	
	Mia M. Thomas	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 November 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/04/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to applicant's remarks received on 04 November 2008. Claims 1-8 and 10-16 are currently amended. No new matter has been added to the application, and all claims are believed to be in condition for allowance. Upon entry of the amendments herewith, claims 1-16 remain pending. A complete response follows herewith.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner is unclear as to what the applicant intends to distinctly claim regarding the subject matter claimed at lines 7 and 15, of claim 1, respectively, with regards to the element "a corresponding filtered pixel". The Examiner is unclear if the digital filtering of a "first type" is the filtering that produced the "corresponding filtered pixel" of line 15 or if the processing of the "at least one pixel of the second video image of the sequence at line 5 is the "corresponding filtered pixel." The Examiner is unsure if "a corresponding filtered pixel" at line 5 is the same as the

"a corresponding filtered pixel" at line 15. Appropriate correction is required for proper claim analysis.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruls (US 20020094130 A1) in combination with Bagni et al. (US 6483928 B1).

Regarding Claim 1: (Currently Amended-As best understood by the Examiner) Bruls teaches a method for filtering the noise of a sequence of digital images in video format comprising ("The invention relates to noise filtering an image sequence. The invention further relates to encoding an image sequence, wherein the image sequence is noise filtered." at paragraph [0001]); processing a first video image of the sequence to obtain a corresponding improved video image with reduced noise ("An object of the invention is to provide advantageous filtering. To this end, the invention provides a method and device for noise filtering an image sequence and a method and device for encoding an image sequence, as defined in the independent claims. Advantageous embodiments are defined in the dependent claims. In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image..." at paragraph [0004-0005]; "To reduce the noise, a filtering operation is necessary." at paragraph [0003])

processing at least one pixel of a second video image of the sequence that temporally follows said first video image, said ~~phase of~~ processing the at least one pixel providing a corresponding filtered pixel and said processing the at least one pixel ("In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image, wherein the original pixel values are weighted under control of the statistics." at paragraph [0005])

carrying out a digital filtering of a first type using pixels ~~forming part of~~ from said first set of pixels selected from the second video image and pixels from said second set of pixels selected from the corresponding improved video image to generate the corresponding filtered pixel (Refer to Figure 1 and 2; "An object of the invention is to provide advantageous filtering. To this end, the invention provides a method and device for noise filtering an image sequence and a method and device for encoding an image sequence, as defined in the independent claims. Advantageous embodiments are defined in the dependent claims." at paragraph [0004]; "In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image, wherein the original pixel values are weighted under control of the statistics. The invention provides a simple method to perform an adaptive filtering, which is preferably applied in a pre-processing stage of a compression system. Statistics may be easily obtained from the at least one image by any known (or yet unknown) calculation, e.g. variance or correlation (or approximation thereof) in a (sub-set) of the at least one image." at paragraph [0005]).

Bagni teaches selecting a first set of pixels ~~comprising said~~ including the at least one pixel and a plurality of pixels of the second video image spatially adjacent to the at least one pixel (Refer to Figure 1 and 2)

selecting a second set of pixels ~~comprising~~ including pixels of the corresponding improved video image homologous with the pixels of said first set of pixels (Refer to Figure 5; "The sum of all the percentages surpasses unity. This is due to the fact that it is possible to have winning predictors that are equal to each other, thus incrementing the percentage of all these predictors. Indeed, one is confronted with a statistic according to which for each macroblock there may be a plurality of choices. By progressively discarding (i.e. not elaborating) the least recurrent candidate, a small worsening of performances in respect to a non-negligible computing reduction has been observed." at column 7, line 11)

Bruls and Bagni are combinable because they are in the same field of image processing, specifically noise reduction and motion measurement.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Bruls and Bagni. All the claimed elements were known in the prior art at the time of the invention. The skilled artisan could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of the teachings of Bruls and Bagni would have yielded predictable results to the skilled artisan at the time of the invention.

The suggestion/motivation for doing so would have been "to digital[ly] process[ing] systems of video images, and in particular, to systems for decoding sequences of compressed pictures by motion prediction and motion compensation algorithms, and to a method of motion estimation." at column 1, line 8-Bagni.

Therefore it would have been obvious to the skilled artisan to combine the teachings of Bruls and Bagni to obtain the specified claimed elements of Claim 1.

Regarding Claim 13 (Currently Amended) Bruls teaches a computer readable memory programmed to direct a filter for reducing noise in a sequence of images in CFA format, the filter operable in accordance with the method of claim 1 ("The invention can be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer." at paragraph [0058])

Regarding Claim 14: (Currently Amended) Bruls teaches an acquisition device comprising: a sensor including a CFA filter, wherein the sensor is operable to acquire a sequence of digital images in CFA format, and wherein the CFA filter is operable to process the sequence of digital images in CFA format in accordance with the method of claim 1 ("An object of the invention is to provide advantageous filtering. To this end, the invention provides a method and device for noise filtering an image sequence and a method and device for encoding an image sequence, as defined in the independent claims. Advantageous embodiments are defined in the dependent claims." at paragraph [0004]; "In a device claim enumerating several means, several of these means can be embodied by one and the same item of hardware. The mere fact that

certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage." at paragraph [0058]).

Regarding Claim 15: (As best understood by the Examiner) Bruls teaches a method of filtering noise from a digital video image comprising ("The invention relates to noise filtering an image sequence. The invention further relates to encoding an image sequence, wherein the image sequence is noise filtered." at paragraph [0001]);

processing a first image to generate an improved image; processing a second, subsequent image after processing the first image("An object of the invention is to provide advantageous filtering. To this end, the invention provides a method and device for noise filtering an image sequence and a method and device for encoding an image sequence, as defined in the independent claims. Advantageous embodiments are defined in the dependent claims. In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image..." at paragraph [0004-0005]; "To reduce the noise, a filtering operation is necessary." at paragraph [0003]);

locating a corresponding second set of pixels in the first image that correspond to the first set of pixels in the second, subsequent image ("In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image, wherein the original pixel values are weighted under control of the statistics." at paragraph [0005])

and filtering the first pixel using data from both the first set of pixels and the second set of pixels (Refer to Figure 1 and 2; "An object of the invention is to provide advantageous filtering. To this end, the invention provides a method and device for noise filtering an image sequence and a method and device for encoding an image sequence, as defined in the independent claims. Advantageous embodiments are defined in the dependent claims." at paragraph [0004]; "In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image, wherein the original pixel values are weighted under control of the statistics. The invention provides a simple method to perform an adaptive filtering, which is preferably applied in a pre-processing stage of a compression system. Statistics may be easily obtained from the at least one image by any known (or yet unknown) calculation, e.g. variance or correlation (or approximation thereof) in a (sub-set) of the at least one image." at paragraph [0005]).

Bagni teaches selecting a first pixel from the second, subsequent image during the processing of the second, subsequent image (Refer to Figure 1 and 2);

selecting a first set of pixels in the second, subsequent image that are have a predetermined spatial relationship to the first pixel (Refer to Figure 5; "The sum of all the percentages surpasses unity. This is due to the fact that it is possible to have winning predictors that are equal to each other, thus incrementing the percentage of all these predictors. Indeed, one is confronted with a statistic according to which for each macroblock there may be a plurality of choices. By progressively discarding (i.e. not elaborating) the least recurrent candidate, a small

worsening of performances in respect to a non-negligible computing reduction has been observed." at column 7, line 11)

Bruls and Bagni are combinable because they are in the same field of image processing, specifically noise reduction and motion measurement.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Bruls and Bagni. All the claimed elements were known in the prior art at the time of the invention. The skilled artisan could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of the teachings of Bruls and Bagni would have yielded predictable results to the skilled artisan at the time of the invention.

The suggestion/motivation for doing so would have been "to digital[ly] process[ing] systems of video images, and in particular, to systems for decoding sequences of compressed pictures by motion prediction and motion compensation algorithms, and to a method of motion estimation." at column 1, line 8-Bagni.

Therefore it would have been obvious to the skilled artisan to combine the teachings of Bruls and Bagni to obtain the specified claimed elements of Claim 15.

7. Claims 2-4, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruls (US 20020094130 A1) in combination with Bagni et al. (US 6483928 B1) and further in view of Gindele et al. (US 2003-0095717 A1).

Regarding Claim 2 (Currently Amended): Bruls and Bagni in combination teach all the claimed elements as rejected above.

Gindele expressly teaches carrying out a first evaluation of motion of the at least one pixel, using pixels forming part of said first set of pixels and part of said second set of pixels; ("Using this assumption, one evaluates the standard deviation of the noise for a number of typical mean pixel values and sets the noise threshold value equal to 2 times the standard deviation." at paragraph [0026]); and in which said at least one pixel is such that said first evaluation of motion is smaller than a first threshold value("If, in block 46, this green pixel value difference is less than or equal to the noise threshold value, then the green pixel value is included in the subsequent noise cleaning calculation shown in block 48." at paragraph [0026]).

Bruls, Bagni and Gindele are combinable because they are in the same field of image enhancement, specifically image filtering.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to perform an evaluation of motion of the at least one pixel, using pixels forming part of said first set of pixels and part of said second set of pixels.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Gindele. All the claimed elements were known in the prior art at the time of the invention. The skilled artisan could have combined the elements as claimed by known methods with no change in their respective functions, and the

combination of the teachings of Bruls, Bagni and Gindele would have yielded predictable results to the skilled artisan at the time of the invention.

The suggestion/motivation for doing so would have been to perform a noise calculation as described at paragraph [0026] and Figure 7. Specifically, "If the green pixel value difference exceeds the noise threshold, then the green pixel value is not used in the subsequent noise cleaning calculation in block 50. Once each green pixel value in the kernel is tested, then a noise cleaned value for the central green pixel value is calculated in block 52. This calculation in this embodiment is a simple average of all of the green pixel values that satisfied the noise threshold value comparison accomplished in block 48." (Gindele). The overall purpose of the "noise cleaning" is to process the digital color images to provide a noise clean sparsely populated color digital image" at abstract, Gindele.

Therefore, it would obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Gindele to obtain the specified claimed elements of Claim 2.

Regarding Claim 3: (Currently Amended-As best understood by the Examiner) Bagni teaches selecting a third set of pixels including the another pixel and a plurality of pixels of the second video image spatially adjacent to it (Refer to Figure 1 and 2)
selecting a fourth set of pixels comprising including pixels of the improved video image homologous with the pixels of said third set of pixels (Refer to Figure 5; "The sum of all the percentages surpasses unity. This is due to the fact that it is possible to have winning predictors that are equal to each other, thus incrementing the percentage of all these predictors. Indeed, one is confronted with a statistic according to which for each macroblock there may be

a plurality of choices. By progressively discarding (i.e. not elaborating) the least recurrent candidate, a small worsening of performances in respect to a non-negligible computing reduction has been observed." at column 7, line 11)

Gindele teaches carrying out a further another evaluation of motion of the further another pixel, using pixels forming part of said third set of pixels and part of said fourth set of pixels ("Using this assumption, one evaluates the standard deviation of the noise for a number of typical mean pixel values and sets the noise threshold value equal to 2 times the standard deviation." at paragraph [0026]);

Bruls teaches whenever said further the another evaluation of motion is smaller than said first threshold value, carrying out a digital filtering of a second type that generates the further another filtered pixel by using exclusively pixels forming part of said third set of pixels (Refer to Figure 1 and 2; "An object of the invention is to provide advantageous filtering. To this end, the invention provides a method and device for noise filtering an image sequence and a method and device for encoding an image sequence, as defined in the independent claims. Advantageous embodiments are defined in the dependent claims." at paragraph [0004]; "In a first embodiment of the invention, statistics in at least one image of the image sequence are determined, and at least one filtered pixel value is calculated from a set of original pixel values obtained from the at least one image, wherein the original pixel values are weighted under control of the statistics. The invention provides a simple method to perform an adaptive filtering, which is preferably applied in a pre-processing stage of a compression system. Statistics may be easily obtained from the at least one image by any known (or yet unknown) calculation, e.g.

variance or correlation (or approximation thereof) in a (sub-set) of the at least one image." at paragraph [0005]).

Regarding Claim 4: (Currently Amended) Bruls teaches each video image of the sequence is made up of a respective pixel matrix ("The invention relates to noise filtering an image sequence. The invention further relates to encoding an image sequence, wherein the image sequence is noise filtered." at paragraph [0001]);

Gindele teaches the pixels of said respective pixel matrix being associated on the basis of their respective positions with one of a set of chromatic components, and wherein said first set of pixels and said second set of pixels comprise pixels associated with the same chromatic component of the at least one pixel ("FIGS. 5A-5C show 5.times.5 kernels or matrices for respectively noise cleaning red, green, and blue color pixels of the FIG. 3 arrangement." at paragraph [0019]).

Regarding Claim 16: (Currently Amended) Bruls teaches performing spatial filtering on the first pixel ("The invention relates to noise filtering an image sequence. The invention further relates to encoding an image sequence, wherein the image sequence is noise filtered." at paragraph [0001]);

Gindele teaches determining a motion component between the first set of pixels and the second set of pixels ("Using this assumption, one evaluates the standard deviation of the noise for a number of typical mean pixel values and sets the noise threshold value equal to 2 times the standard deviation." at paragraph [0026]); and carrying out a motion compensator filtering if the

motion component between the first set of pixels and the second set of pixels is above a selected threshold and not carrying out motion compensation filtering if the motion component between the first set o3 pixels and the second set of pixels is below a selected threshold ("If, in block 46, this green pixel value difference is less than or equal to the noise threshold value, then the green pixel value is included in the subsequent noise cleaning calculation shown in block 48." at paragraph [0026]).

Bruls, Bagni and Gindele are combinable because they are in the same field of image enhancement, specifically image filtering.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to carry out a motion compensator filtering if the motion component between the first set of pixels and the second set of pixels is above a selected threshold and not carrying out motion compensation filtering if the motion component between the first set o3 pixels and the second set of pixels is below a selected threshold.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Gindele. All the claimed elements were known in the prior art at the time of the invention. The skilled artisan could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of the teachings of Bruls, Bagni and Gindele would have yielded predictable results to the skilled artisan at the time of the invention.

The suggestion/motivation for doing so would have been to perform a noise calculation as described at paragraph [0026] and Figure 7. Specifically, "If the green pixel value difference exceeds the noise threshold, then the green pixel value is not used in the subsequent noise cleaning calculation in block 50. Once each green pixel value in the kernel is tested, then a noise cleaned value for the central green pixel value is calculated in block 52. This calculation in this embodiment is a simple average of all of the green pixel values that satisfied the noise threshold value comparison accomplished in block 48." (Gindele). The overall purpose of the "noise cleaning" is to process the digital color images to provide a noise clean sparsely populated color digital image" at abstract, Gindele.

Therefore, it would obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Gindele to obtain the specified claimed elements of Claim 16.

8. Claim 5, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruls (US 20020094130 A1) in combination with Bagni et al. (US 6483928 B1) and further in view of Kalevo et al. "Noise Reduction Techniques for Bayer-Matrix Images"; Sensors and Camera Systems for Scientific, Industrial and Digital Photography, pages 348-359.

Regarding Claim 5: (Currently Amended) Bruls and Bagni in combination teach all the claimed elements as rejected above.

Kalevo teaches each video image of the sequence is in Bayer CFA format and said chromatic components form part of the set including the color red, the color green and the color blue ("The CFA, which is usually used, is called as Bayer-matrix. It consists of read, green and blue color

filter elements arranged so, that each sensor element, also called as picture element (pixel) collects only one colored light." at page 349, Section 2, Image Processing Chain).

Bruls, Bagni and Kalevo are combinable because they are in the same field of image enhancement, specifically image filtering.

At the time that the invention was made, it would have been obvious that a video image sequence is in Bayer CFA format and that the chromatic components form part of the colors red, green and blue. A color filter array (Bayer) matrix is well known in the art. It is also well known in the art that a Bayer filter has a description of one blue, one red and two green elements.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to utilize each video in the sequence in a Bayer CFA format. It is well known to utilize Bayer type filters, further that they have chromatic components of the colors red, blue and green.

Therefore, it would obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Kalevo to obtain the specified claimed elements of Claim 5.

Regarding Claim 6 (Currently Amended): Kalevo teaches selecting the first set of pixels aligns a selection matrix according to the chromatic component of the at least one pixel ("When the post CFAI-NR image processing chains is used the image consists on all the three color component values for each pixel, when the NR is applied. When the pre-CFAI NR chain is used

the image consists on only one-color component value for ach pixel, when the NR is processed. Any of the 4-neighbor pixels does not consist of the same color component value as the center pixel.) the selection matrix being such as to select pixels that are situated in the neighborhood of the at least one pixel and having the same chromatic component as said at least one pixel ("Usually, the NR filter processes full three-color component image data. This requires that raw Bayer-Matrix image data, available from the image sensor, is first interpolated by using Color Filter Array Interpolation (CFAI) method." at abstract), and discard pixels having a different chromatic component as said at least one pixel, the selection matrix being identical for the chromatic components red and blue ("Removing the other color components from the original three color components from the original three color component image data the one color component image data has been generated." at page 348, Section I, Introduction, paragraph 6).

9. Claims 7-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruls (US 20020094130 A1) in combination with Bagni et al. (US 6483928 B1) and further in view of Heimburger et al. (5,490,094).

Regarding Claim 7: (Currently Amended) Bruls and Bagni in combination teach all the claimed elements as rejected above. Bruls and Bagni in combination does not specifically (expressly) teach estimating a statistical parameter [$(\sigma)_n^{GL}$] representative of the global noise present in said first image the digital filtering of the first type utilizing said statistical parameter.

Heimburger teaches estimating a statistical parameter representative of the global noise present in said first image the digital filtering of the first type utilizing said statistical parameter (Refer to column 3, lines 12-28)

Additionally, Heimburger teaches expressly at claim 1, line 1, and at column 7, line 66, "a method for noise reduction of a digital video input signal comprising the steps of filtering said digital video input...". This recitation is to further support the claimed limitation of "digital filtering". Further see column 3, line 66; "The global noise statistics can be calculated in a noise measurement circuit 20.

Bruls, Bagni and Heimburger are combinable because they are in the same field of image enhancement, specifically image filtering for noise reduction.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to estimate a statistical parameter [(sigma) $_{n}{}^{GL}$] representative of the global noise present.

The suggestion/motivation for doing so would have been to accurately estimate "the size of the noise estimation window. Further the noise estimation window can be different from the size of the window used by the restoration filter, wherefore they can be adjusted independently for optimal performance." at column 3, line 25, Heimburger.

Therefore, it would obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Heimburger to obtain the specified claimed elements of Claim 7.

Regarding Claim 8: (Currently Amended) Heimburger teaches selecting a plurality of pixels of the first video image (Refer to Figure 3; also column 4, lines 26-48);

calculating a plurality of local estimates ("A noisy input signal x is filtered with a restoration filter of median type to generate a filtered input signal y. The sum of the absolute differences between filtered and unfiltered signal is calculated for each position of a sliding window within the input signal representing a local estimate of the noise..." at abstract), wherein calculating the plurality of local estimates includes calculating for each given pixel of said plurality of pixels a respective estimate of a statistical parameter representative of local noise present in a neighborhood of the given pixel ("This method allows switching between filters depending on the statistical properties of the local filtered and unfiltered pictures." at column 4, lines 19-26); and wherein said estimate of the statistical global noise parameter [$(\sigma)_n^{GL}$] is obtained from said plurality of local estimates ("...filtering said digital video input signal by applying said digital video input signal in parallel to at least three circuit branches, a first of said circuit branches containing no filter, the remaining branches containing respective filters of differing filter types; estimating for each said circuit branch within a sliding window in a current picture of said digital video input signal a local noise value from the quadratic error between the filter output signals of each two consecutive branches by calculating pixel difference signals within said window; forming for each branch a weighted average of the two signals used in each of said two consecutive branches for estimating said quadratic error, thereby taking into account for the weight a global noise value and the local noise value for the branch..." at column 8, line 1).

Regarding Claim 9: (Original) Heimburger teaches said local estimates are local variance measures ("The sum of the absolute differences between filtered and unfiltered signal is

calculated for each position of a sliding window within the input signal representing a local estimate of the noise..." at abstract; "The present invention applies to noise reduction systems of a type in which, for estimating a local noise value within a sliding window of a picture..." at column 1, line 23, further at column 3, line 21).

Regarding Claim 10: (Currently Amended) Heimburger teaches said plurality of pixels includes pixels forming part of homogeneous regions of the first video image ("The sliding window 30 depicted in FIG. 3 has a size of 5 pixels by 3 lines. As the processing is not on a frame basis but on a field (F1; F2) basis, this size corresponds to a region of 5 by 5 pixels for the interlaced picture (lines of filed F1)." at column 4, line 28, further; "The present invention, however, provides a technique of noise reduction that is both globally and locally adaptive. In other words, noise reduction in the systems described herein adapts both to large features and to fine detail of displayed images." at column 3, line 9).

Regarding Claim 12: (Currently Amended) Heimburger teaches estimating for the another pixel another statistical parameter representative of the noise present on the pixels of said third set of pixels(Refer to column 3, lines 29-38), said another statistical parameter estimated to a specific color of the another pixel, the digital filtering of the second type utilizing said another parameter ("...estimating for each said circuit branch within a sliding window in a current picture of said digital video input signal a local noise value from the quadratic error between the filter output signals of each two consecutive branches by calculating pixel difference signals within said window..." at column 8, line 6-11).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bruls (US 20020094130 A1) in combination with Bagni et al. (US 6483928 B1) and further in view of Heckman (US 2002/0164063 A1).

Regarding Claim 11: (Currently Amended) Bruls and Bagni in combination teach all the claimed elements as rejected above. Bruls and Bagni in combination does not (expressly) teach a Duncan Range Test.

However, Heckman teaches identifying from part of said first set of pixels and part of said second set of pixels during a selection phase carried out in accordance with a Duncan Range Test, wherein said digital filtering of the first type utilizes the subset of pixels (Refer to paragraph [0138] and [0140]).

Bruls, Bagni and Heckman are combinable because they are in the same field of image enhancement, specifically classification of images.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to utilize a classification method of selecting pixels of interest using the Duncan Range Test.

The suggestion/motivation for doing so would have been because "the statistical significance of differences among sample means within each experiment was determined by the Duncan multiple range test. To determine whether any factor's values differed among treatment groups

within an experiment, the GLM and MODEL discriminant analysis procedures of SAS were used." (paragraph [0140], Heckman).

Therefore, it would obvious to one of ordinary skill in the art to combine the teachings of Bruls, Bagni and Heckman to obtain the specified claimed elements of Claim 11.

Response to Arguments

11. Applicant's arguments filed 04 November 2008 have been fully considered and a complete response to those remarks is provided below.

Summary of Remarks:

A. Claims 1-16 remain pending. No new matter has been added to the application, and all claims are believed in condition for allowance. See page 7 of applicant's remarks, Claims 1, 3, 7, 8 and 10 were objected to under 37 CFR 1.75 (a). Applicant request withdrawal of the objections.

Examiner's Response:

B. Examiner withdraws the objections. With regards to Claims 1, 3, 7, 8 and 10 which were objected to under 37 CFR 1.75 (a), the Examiner withdraws the objection to the claims based upon the new clarifications and amendments.

Summary of Remarks:

C. See page 8 of remarks, 35 USC 101 Rejections, regarding Claims 13 and 14, which have been amended and applicant requests withdrawal of the rejections.

Examiner's Response:

D. In accordance with the newly amended claims 13 and 14, the 35 USC 101 Rejections have been withdrawn.

Summary of Remarks:

E. At page 9, regarding Section III, subsection a, claims 1, 13 and 14; "Kalevo does not disclose, teach or suggest a sequence of digital images." At subsection ii, page 10, subsection iii, section b (Claim 2 at page 11), section c (Claim 3 at page 12), section d (claim 4 at page 12-13), subsection h, page 14 (Claim 15) are allowable over the prior references cited.

Examiner's Response:

F. The aforementioned remarks have been considered but are moot in view of the new ground(s) of rejection. See newly rejected claims above.

Summary of Remarks:

G. At page 13, subsection e, Claim 7, Heimburger cannot use the global measure for digital filtering of first type.

Examiner's Response:

H. Examiner respectfully disagrees. Heimburger more than adequately teaches the limitation of estimating a statistical parameter representative of a global noise. Since the applicant has not disclosed what a first type of image filtering is in the claimed limitation, the Examiner has given met the limitation accordingly. Further, Heimburger teaches the accurate estimation of "the size of the noise estimation window. Further the noise estimation window can be different from the

size of the window used by the restoration filter, wherefore they can be adjusted independently for optimal performance." at column 3, line 25, Heimburger. Claim 7 is not allowable over the newly rejected claim 7 in view of Bruls in combination with Bagni and Heimburger.

Summary of Remarks:

I. At page 13, subsection f, Claim 8, Heimburger has no disclosure, suggestion or teaching that his global measure of noise is obtained from the plurality of local estimates.

Examiner's Response:

J. Examiner respectfully disagrees. Heimburger teaches "The sum of the absolute differences between filtered and unfiltered signal is calculated for each position of a sliding window within the input signal representing a local estimate of the noise, and is combined with a global measure of the input signal noise to compute two coefficients a and b which are respectively applied to the unfiltered and filtered signal to generate the output signal z=a*x+b*y which is both globally and locally adapted to the structure of displayed images. Advantageously different kinds of filters operate in parallel, whereby the kind of filter elected is locally adapted to the picture activity." at abstract. The combination of the difference between the filtered signal and the unfiltered signal with a "global measure" is processed in a global measurement circuit which is also taught at column 1, line 21. The Examiner believes that this limitation is met by the teaching of Heimburger since the mathematic manipulation of these claimed elements still yields the predictable result of estimation of a statistical global noise parameter.

Summary of Remarks:

K. At page 13, subsection 6, Claim 11, Heckman does not teach, disclose, or suggest using DRT for selection of pixels, subsets or anything other than a statistical significance of differences. Heckman fails to suggest, teach or disclose the elements of Claim 11.

Examiner's Response:

L. Examiner respectfully disagrees. Heckman teaches the Duncan Range Test for image processing manipulation to determine "The statistical significance of differences among sample means within each experiment." The combination of the teachings of Bruls, Bangi and Heckman is what renders claim 11 unpatentable. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Heckman is still in the field of image processing, specifically with regards to analysis, classification and counting or statistical analysis. The rejection of Claim 11 stands.

Summary of Remarks:

M. It is respectfully requested that the Examiner review and initial the Patent and Non-Patent Literature (NPL) Documents filed on form PTO-1449 with the original application, granted the filing date of August 12, 2003. The Examiner considered the references on July 31, 2008 and signed the PTO-1449 form, however, the individual references are not yet initialed. The references include US 6,229,578 to *Acharya et al.* and NPL documents by *Bosco et al., Kalevo et al.,* and *Yan.*

Examiner's Response:

N. On 04 August 2008, the Examiner noted on the PTO 1449 sheet that "All reference were considered except where line through" and initialed and signed that Document. It is possible that the applicant is unable to view that particular line of the PTO Form 1149 since that statement is at the very bottom of the page. To clarify for the applicant that all NPL documents have been considered and made of record, the Examiner will initial each of the documents and re-consider the documents.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is (571)270-1583. The examiner can normally be reached on Monday-Thursday 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mia M Thomas/

Examiner, Art Unit 2624

/Vikkram Bali/

Supervisory Patent Examiner, Art Unit 2624